REMARKS

Claims 1-37 and 49-50 were examined and rejected. Claims 38-48 have been previously canceled. Applicants amend claim 50 to correct a typographical error. Applicants respectfully request reconsideration of claims 1-37 and 49 and 50 in view of at least the following remarks.

I. Claims Rejected Under 35 U.S.C. §102

The Patent Office rejects claims 49-50 under 35 U.S.C. § 102(b) as being anticipated by WO 02/067014 to Harel et al. ("Harel"). It is axiomatic that to be anticipated, every limitation of a claim must be disclosed within a single reference.

Applicants respectfully disagree with the rejection above of claim 49, for at least the reason that the cited references do not teach or suggest a photodetector comprising a heterojunction formed of two semiconductor materials, being halides, wherein at least one of the first and second semiconductor materials consist essentially of a semiconductor material, as required by claim 49. According to claim 49, for example and without providing limitation thereto, one of the two materials that form the heterojunction is a semiconductor material, excluding other elements from having any essential significance to the semiconductor material, i.e. excluding other elements that do not materially affect the basic and novel characteristics of the semiconductor material.

On the other hand, Harel teaches producing wide band gap semiconductor particle-in-binder (PIB) composite detectors having particulate semiconductors combined with polymeric binders. (See page 4, lines 1-3) Specifically, Harel describes grains of mercuric iodide powder mixed with a binder, such as acrylic, ester derivatives, rubber, polymers, etc. (See page 19-20, lines 6-7) The material is mixed thoroughly to wet all of the particles of mercuric iodide powder and to obtain a homogenous mixture (see page 20, lines 6-7) which is then applied to an adhesive coated substrate by screen printing die pressing, doctor blade, slot coater, or Mayer rod (see page 20, lines 8-16; page 14, lines 9-11; and page 15, lines 15-18). Moreover, Harel teaches a photoconducting hybrid bi-layer detector plate 10 having a primary layer of mercuric iodide (5) over a buffer layer of lead iodide (4) (see page 30).

However, the Patent Office has not identified and Applicants are unable to find any description in Harel that teaches or suggests a heterojunction of at least one semiconductor materials that consists essentially of a semiconductor material, as required by amended claim 49. As known in the art, such a semiconductor material has a band gap, such as those given in paragraph 34 of Applicants' specification for materials that consists essentially of the specific semiconductor materials mentioned, but does not have a band gap of a particle-in-binder (PIB) material as taught by Harel (See page 4, lines 1-3 of Harel). Moreover, as know in the art, a semiconductor material that consists essentially of a semiconductor material, may be formed by various techniques including chemical vapor deposition (CVD), sputter, and ion beam deposition (e.g., as noted in paragraph 35 of the Applicants' specification as filed), but are not formed of particles of semiconductor material mixed with binder material as taught by Harel (See **Figures 12-13** of Harel contrasting the sensitivities of PIB semiconductor materials as compared to CVD semiconductor materials).

For instance, it can be appreciated that the particles of mercuric iodide powder, wet with the binder in a homogenous mixture of Harel will not dry to form a semiconductor material that consists essentially of a semiconductor material. Although the PIB composite may include, on occasion, attached halide particles at various locations, the material will also include binder which has an essential significance to the semiconductor material by effecting its band gap and conductivity. For instance, Harel teaches a binder, such as a Polymeric Binder as part of the imaging composition existing in a radiation detector plate (see Harel page 4). Thus, binder will exist between some of the semiconductor particles within the plate. Hence, it is not disclosed or necessary that the PIB material be a semiconductor material that consists essentially of a semiconductor material because the binder material will exist at locations between the particles of Harel.

Moreover, to this end, Harel teaches that PIB semiconductor materials provide different conduction sensitivity than physical vapor deposition (PVD) semiconductor materials (e.g., PVD materials, without limitation thereto, are an example of a semiconductor material that consists essentially of a semiconductor material) (see Harel pg. 14 paragraph 3; and Figures 6, 12, and 13). This difference in conduction is one motivation behind the invention of Harel. Specifically, the Patent Office has not identified and Applicants are unable to find any disclosure in Harel of binders that

include conductive or semiconductive material (see, Harel, pg. 19, last para. through pg. 18, first para.). For instance, Harel teaches polystyrene in toluene mixed thoroughly with mercuric iodide powder to obtain a homogeneous mixture (see, Harel, pg. 20, lines 6-7). As a result, Harel teaches non-conductive binder existing between the particles along the junction of Harel. Hence, for at least the reasons above, the reference does not teach or suggest the limitations above, and Applicants respectfully request the Patent Office withdraw the rejection of claim 49 above.

Also, the background of Harel indicates that single crystal or polycrystalline semiconductor structures (e.g., which without limitation thereto, are a type of semiconductor material that consists essentially of a semiconductor material as claimed), have disadvantages which the PIB composite improves. Thus, Applicants believe that upon reading the background and other sections of the specification of Harel, a practitioner in the art would not be motivated to create the semiconductor material that consists essentially of a semiconductor material claimed in Applicants' independent claims, since the single crystal or polycrystalline semiconductor structures are what the PIB composite of Harel is designed to replace.

In fact, since the purpose of the PIB composites of Harel is to use the PIB composites in place of single crystal materials or polycrystalline materials (e.g., solid phase semiconductor films) to improve the shortcomings of single crystal materials or polycrystalline materials (see background of Harel), Harel teaches against a semiconductor material that consists essentially of a semiconductor material. Specifically, Harel teaches a radiation detector plate including a composition layer comprising an addmixture of particulate semiconductor with a polymeric binder (see, Harel pg. 4, para. 2), to allow for better direct X-ray radiation to electrical signal conversion that in prior art converters, while having a sensitivity close to the order of magnitude obtained by polycrystalline detector plates and imagers produced by PVD-type processes (see, Harel pg. 3, 1st para. of Summary of Invention Section). Harel also points out that the primary PIB layer has a sensitivity only 40-50% of that of non-composite polycrystalline HgI2-PVD produced imagers (see page 18 paragraph 3 and Figure 6).

Thus, Harel distinguishes its PIB composite from a semiconductor material that consists essentially of a semiconductor material, and identifies its PIB composite as an improvement to those materials, although less sensitive. Specifically, at page 2

paragraph 1 Harel described that composite imagers, such as imagers made of a composite of particles and binders (*e.g.* PIB imagers, see page 4, paragraphs 1 and 2) are different than physical vapor deposition (PVD) imagers of the same semiconductor, and that the PIB invention allows for better direct X-ray radiation to electrical signal conversion (see page 3, paragraph 1 of Summary of Invention). Thus, the composite imagers of Harel teach PIB type imagers which Harel distinguishes from and teaches against compound semiconductor material that consists essentially of a semiconductor material, such as those claimed in claim 49 (also see Harel Figures 6, 12, and 13).

Hence, for at least the reasons above, including the reason that Harel teaches against the limitations above of claim 49, Applicants respectfully request the Patent Office withdraw the rejection of claim 49 above.

The Patent Office rejects claim 1-5, 7-13, 16-19, 27-29 (apparently and 30-36) and 49-50 under 35 U.S.C. § 102(e) as being anticipated by US Patent No. 6,995,375 to Sato et al. ("Sato").

Applicants overcome the above rejections by the Rule 131 Declarations and supporting evidence (Attachments A-H) attached hereto. Those declarations and supporting evidence show that the subject matter of the rejected claims as amended, to the extent disclosed in Sato, enjoys an earlier date of invention than the priority date of Sato. Specifically, independent claims 1, 30, 31, and 49 claim features which the declarations and supporting evidence show to enjoy an earlier date of invention than the priority date of Sato. Thus, Sato is no longer prior art to the invention.

II. Claims Rejected Under 35 U.S.C. § 103

The Patent Office rejects claim 6 under 35 U.S.C. §103(a) as being unpatentable over Sato in view of U.S. Patent No. 6,353,229 issued to Polischuk, et al. ("Polischuk"). Also, the Patent Office rejects claims 14-15 and 20 under 35 U.S.C. §103(a) as being unpatentable over Sato in view of U.S. Patent No. 6,949,749 to Tokuda et al. ("Tokuda"). Next, the Patent Office rejects claims 21-26 under 35 U.S.C. §103(a) as being unpatentable over Sato in view of U.S. Patent No. 6,949,750 to Tusutsui et al. ("Tusutsui").

Applicants submit that dependent claims 6, 14-15 and 20-26 being dependent upon an allowable base claim 1, are patentable over the cited references for at least the reasons described above in support claim 1. Hence, for at least those reasons, Applicants respectfully request the Patent Office withdraw the rejection above of claims 6, 14-15 and 20-26.

Moreover, Polischuk fails to cure the shortcoming of the references noted above for independent claims 1, 30, 31, and 49. Polischuk teaches that a top electrode material may be palladium, gold, aluminum, molybdenum, or platinum (see column 5 lines 54-56) but does not disclose or teach the above noted limitations of claims 1, 30, 31, and 49.

Similarly, Tokuda fails to cure the shortcomings of the references noted above for independent claims 1, 30, 31, and 49. Specifically, Tokuda teaches electroconductive resin 30 such as epoxy resin, acrylic resin, or modified urethane resins mixed with carbon or metallic particles, etc. to electrically conductive (see Abstract and column 8 lines 26-31). However, Tokuda fails to teach the above noted limitations of claims 1, 30, 31, and 49.

Finally, Tusutsui fails to sure the shortcomings of the other references for independent claims 1, 30, 31, and 49. Tusutsui discloses a single photo conversion layer 4 but not dual layers, or a heterojunction as required by claims 1, 30, 31, and 49.

Applicants submit that any dependent claims not mentioned above, being dependent upon allowable base claims, are patentable over the cited references for at least the reasons explained above. Thus, Applicants respectfully request that the Patent Office withdraw the rejection of dependent claims as being unpatentable over the cited references.

CONCLUSION

In view of the foregoing, it is believed that all claims now are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666.

Respectfully submitted,

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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below to the United States Patent and Trademark Office.

Suzanne Johnston 7/20/07
Date